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14. ABSTRACT A Wireless Vital Signs Monitor (WVSM) has been developed by the Office of Naval Research (ONR) and the United States Army Institute of Surgical Research (USAISR). This monitor incorporates several sensors from different manufacturers that can be implemented far out to the point of injury and adds complete trend analysis over four hours. Multicenter trials have been completed and the instrument is FDA approved. This WVSM is too bulky for field operations by US Special Forces (SOCOM), but functional prototypes of an alternative miniature wireless monitoring device with improved trend analysis even further out to the point of injury have now been delivered (SOCOM-Mini-medic™). There have been no field tests to date. The primary objective of this project is to perform the first field tests of the SOCOM Mini-medic. The main focus is to validate the mini-Medic for combat casualty care (including, but not limited to, brain injury) in prehospital and hospitalized patients. Lessons learned from our previous and ongoing trials in trauma patients with and without brain injury will be applied.					
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F. SUMMARY

A. GOAL

To evaluate for the US Special Operations Command (SOCOM) a miniature, portable wireless vital signs monitor (MWVSM, Mini-medic™, www.athenagtx.com) that could aid in the triage and diagnosis of trauma patients with and without traumatic brain injury (TBI). The MWVSM consists of two components, both of which are the approximate size and weight of a cell phone: one is a sensor that is placed either on the forehead or the fingertip of a casualty and the other is a monitor that receives a wireless signal transmitted up to 100 m carried by the medic.

B. HYPOTHESIS

This project has been totally driven by the technological needs of SOCOM, rather than by a classical hypothesis. Basically, the MWVSM was developed by www.athenagtx.com to capture whatever useful biological information is possible from small sensors placed on the forehead (or at a peripheral extremity site) of up to 5 casualties, then wirelessly transmit to small cell-phone sized monitors carried by any first responder within range. The need was to triage, prioritize transport and to track changes in numerous casualties in an austere environment from a remote location. Within that context, to evaluate the MWVSM, we proposed the overall working hypothesis that: changes in multiple parameters or derived variables monitored from the forehead (or extremity) of a severely injured patient correlate favorably with conventional vital signs monitors either before or after definitive treatment at a level 1 trauma center.

C. EVALUATION

1) PREHOSPITAL

The purpose is to test whether spot measurements from miniature wireless vital signs monitor (MWVSM) can identify civilian trauma patients during prehospital transport who will require a lifesaving intervention (LSI) upon hospital admission.

METHODS From December 2011 to June 2013, a prospective trial was conducted in collaboration with prehospital providers. The MWVSM detects skin temperature, pulse oximetry (SpO2), heart rate (HR), pulse wave transit time, and a derived Murphy Factor (MF) which is an overall status indicator. LSIs included: intubation, tube thoracostomy, central line insertion, blood product transfusion, and operative intervention. Prehospital MWVSM data were compared with simultaneous vital signs (SaO2, systolic blood pressure (SBP), and HR) from a conventional vital signs monitor. Sensitivity, specificity, negative predictive value, positive predictive value, and area under the receiving operating characteristic curves were calculated.

RESULTS Ninety-six trauma patients experienced predominantly blunt trauma (n = 80, 84%), were mostly male (n = 79, 82%), and had a mean \pm SD age of 48 ± 19 years and an Injury Severity Score (ISS) of 10 (17). Those who received an LSI (n = 48) had similar demographics but higher ISS (18 vs. 5) and mortality (23% vs. 0%) (all p < 0.05). The most common LSIs were intubation (n = 24, 25%), blood product transfusion (n = 19, 20%), and emergency surgery (n = 19, 20%). Compared with HR > 100 beats/min, SBP < 90 mm Hg, SaO2 < 95%

alone or in combination, MF > 3 during the entire transport time had the largest area under the receiving operating characteristic curves (0.620, $p = 0.081$). MF greater than 3 had a specificity of 81%, sensitivity of 39%, positive predictive value of 68%, and negative predictive value of 57% for the need for LSI.

CONCLUSION A single numeric value has the potential to summarize overall patient status and identify prehospital trauma patients who need an LSI. Prehospital monitoring combined with algorithms that include trends over time could improve prehospital care for both civilian and military trauma.

2) INHOSPITAL

The purpose was to compare continuous data from a bedside hemodynamic monitor with a MWVSM. The previous study demonstrated basic proof of concept. This study was conducted in more controlled setting of a trauma intensive care unit (TICU).

METHODS: A prospective trial was conducted in 59 TICU patients. Systolic blood pressure [SBP], temperature, heart rate [HR], and O₂ saturation [SpO₂] were continuously displayed on a bedside monitor for 60 min. Shock index (SI) was calculated off line. MWVSM sensors were attached to the forehead and finger of each patient. Data included pulse wave transit time (PWTT), temperature, HR, SpO₂, and a summary value termed "Murphy factor" (MF), which ranges from 0-5. The patient is classified as "routine" if MF=0-1 or SI=0-0.7, "priority" if MF=2-3 or SI=0.7-0.9, and "critical" if MF=4-5 or SI≥0.9.

RESULTS: Both forehead and finger MWVSM HRs differed from the monitor (both $p<0.001$) but only by 2-3 bpm. Differences in MWVSM SpO₂ (1-7%) and temperature (6-13°F) from the monitor were site specific (all $p<0.001$). Forehead PWTT (271±50 msec) was less ($p<0.001$) than finger PWTT (315±42 msec) and both were dissociated from SBP (both $r^2<0.05$). SI distributed patients about equally as "routine," "priority," and "critical", whereas MF overtriaged to "routine" and undertriaged to "critical" for both sensors (all $p<0.001$).

CONCLUSIONS: MF does not accurately predict the most critical patients likely because erroneous PWTT values confound MF. The concept of MF and the MWVSM is promising, but requires further fine-tuning prior to deployment.

D. PUBLICATIONS/PRESENTATIONS DIRECTLY RELATED TO EVALUATION

- 1) Allen CJ, Teisch LF, Meizoso JP, Tashiro J, Ray JJ, Schulman CI, Sola JE, Proctor KG: Pre-hospital care and transportation of pediatric trauma patients Revision 1 submitted 1/29/15 to J Surg Res
- 2) Meizoso JP, Valle EJ, Allen CJ, Ray JJ, Jouria JM, Teisch LF, Namias N, Schulman CI, Proctor KG: Decreased mortality and shorter transport times after prehospital interventions in severely injured trauma patients. Submitted 1/21/15 to J Trauma Acute Care Surg
- 3) Meizoso JP, Allen CJ, Ray JJ, Van Haren RM, Teisch LF, Ruiz-Baez X, Livingstone AS, Namias N, Schulman CI, Proctor KG: Further evaluation of wireless vital signs in a trauma intensive care unit. Submitted to Military Med
- 4) Van Haren RM, Thorson CM, Valle EJ, Busko AM, Jouria JM, Livingstone AS, Namias N, Schulman CI, Proctor KG: Novel prehospital monitor with injury acuity alarm to identify trauma patients who require life saving intervention. J Trauma Acute Care Surgery 2014 Mar;76(3):743-9

Other works, presentations and abstracts

- 1) Valle EJ, Allen CJ, Meizoso JP, Livingstone AS, Namias N, Schulman CI, Proctor KG: Are prehospital interventions justified in polytrauma patients? Presented at 2014 Amer College of Surgeons Florida Committee on Trauma Paper Competition Jacksonville, FL Oct 2014
- 2) Meizoso JP, Allen CJ, Nissan JJ, Ruiz-Baez X, Schulman CI, Namias N, Proctor KG: Further evaluation of wireless vital signs in a trauma intensive care unit.
 - a. submitted 1/19/2015 to 26th Annual Fellow, resident, and medical student surgical research forum, South Florida Chapter of the American College of Surgeons, Miami, FL Apr 2015

- b. Presented at 2014 Amer College of Surgeons Committee on Trauma Region 4 Competition Orlando, FL Nov 2014
 - c. Presented at 2014 Amer College of Surgeons Florida Committee on Trauma Paper Competition Jacksonville, FL Oct 2014 (* 1st place Research Award)
 - d. Presented at 6th Annual Postdoctoral Fellows Research Day, University of Miami Miller School of Medicine, Miami, FL Sep 2014
- 3) Allen CJ, Meizoso JP, Tashiro J, Nissan JJ, Schulman CI, Neville HL, Sola JE, Proctor KG: Pre-Hospital Care And Transportation Times Of Pediatric Trauma Patients. Accepted for presentation 10th Annual Academic Surgical Congress, Las Vegas, NV Feb 2015
 - 4) Allen CJ, Tashiro J, Meizoso JP, Nissan JJ, Schulman CI, Perez EA, Lasko D, Neville HL, Proctor KG, Sola JE: Injury Patterns Associated with Pediatric Bicycle Accidents: Experience Of A Level 1 Trauma Center. Accepted for presentation 10th Annual Academic Surgical Congress, Las Vegas, NV Feb 2015
 - 5) Van Haren RM, Thorson CM, Valle EJ, Busko AM, Guarch GA, Jouria JA, Blackbourne LH, Livingstone AS, Namias N, Proctor KG: Novel prehospital monitor with injury acuity algorithm to identify patients who require life saving intervention. Presented at 72nd Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery, San Francisco, CA Sep 2013
 - 6) Allen CJ, Valle EJ, Jouria J, Namias N, Proctor KG. Evaluation of Wireless Vital Signs Monitor in Trauma Patients. Smart Monitoring 2013, Pathways to Automated Critical Care. Fort Lauderdale, FL Aug 2013.
 - 7) Valle EJ, Allen CJ, Jouria J, Namias N, Proctor KG. Automated Critical Care: Pressors in Trauma Care. Smart Monitoring 2013, Pathways to Automated Critical Care. Fort Lauderdale, FL Aug 2013
 - 8) Van Haren RM, Thorson CM, Valle EJ, Guarch GA, Busko AM, Namias N, Livingstone AS, Proctor KG: Prehospital triage tool to predict life saving interventions. Presented at 2012 Annual Meeting, American College of Surgeons, Florida Committee on Trauma Resident Paper Competition, Gainesville, FL Oct 2012.
 - 9) Van Haren RM, Thorson CM, Ryan ML, Curia E, Barrera JM, Busko AM, Guarch GA, Namias N, Proctor KG: Non-invasive monitoring technologies from the frontline to the FST and beyond:
 - a) Presented at Florida Medical Association Poster Symposium Boca Raton, FL Jul 2012
 - b) Presented at Military Health System Research Symposium MHSRS/ATACCC 2012, Fort Lauderdale, FL, Aug 2012
 - c) Presented at University of Miami Annual Postdoctoral Fellows Research Day. Miami, FL, Sep 2012.

E. OTHER PUBLICATIONS RELATED TO APPROVED SOW DURING AWARD PERIOD

Monographs, editorials, and invited reviews

- 1) Meizoso JP; Nissan JJ; Allen CJ; Van Haren RM; Ruiz G; Namias N; Schulman CI; Pizano LR; Proctor KG: Hypercoagulability and venous thromboembolism in burn patients. Semin Thromb Hemost. 2015 Feb;41(1):43-48. Epub 2015 Jan 15.
- 2) Van Haren RM, Thorson CM, Blackbourne LH, Proctor KG: Prehospital Fluid Resuscitation in civilian and military populations. Chapter 7 in Hemoglobin-based oxygen carriers as Red Cell Substitutes and Oxygen Therapeutics by HW Kim and AG Greenburg,(eds) Springer-Verlag, Berlin/Heidelberg, Germany 2013 pp 127-138 ISBN 978-3-642-40716-1 ISBN 978-3-642-40717-8 (eBook)
- 3) Proctor KG: Invited editorial comment on "Differential Effects of Fresh Frozen Plasma and Normal Saline on Secondary Brain Damage in a Large Animal Model of Polytrauma, Hemorrhage and Traumatic Brain Injury" J Trauma Acute Care Surg 2013 Dec 75(6):974-975
- 4) Thorson CM, Dubose JJ, Rhee P, Knuth TE, Dorlac WC, Bailey JA, Garcia GD, Ryan ML, Van Haren RM, Proctor KG: Military trauma training at civilian centers: a decade of advancements. J Trauma Acute Care Surg 2012 Dec;73(6): S483-S489

- 5) Van Haren RM, Proctor KG: Invited editorial: Clinically Relevant Animal Models Needed to Advance State of the Art Fluid Resuscitation Crit Care Med 2012 Nov;40(11):3096-7.
- 6) Thorson CM, Namias N, Proctor KG. Letter to editor Re: Does hemopericardium after chest trauma mandate sternotomy? J Trauma Acute Care Surg. 2012 Jul;73(1):291-2
- 7) Ogilvie MP, Ryan ML, Proctor KG: Hetastarch during initial resuscitation from trauma. J Trauma 2011 May;70(5):S19-21
- 8) McSwain NE, Champion HR, Fabian TC, Hoyt DB, Wade CE, Eastridge BJ, Proctor KG, Rasmussen TE, Roussel RR, Butler FK, Holcomb JB, Schreiber MA, Shackford SR, Blackburn LH. State of the Art of Fluid Resuscitation 2010: Prehospital and Immediate Transition to the Hospital J Trauma 2011 May; 70(5): S2-S10 Erratum J Trauma 2011Aug; 71(2):520
- 9) Ryan ML, Thorson CM, Otero CA, Vu T, Proctor KG: Clinical Applications of Heart rate variability in the triage and assessment of traumatically injured patients. Anesthesiology Res Pract 2011;2011:416590. Epub 2011 Feb 10.

Juried or refereed journal articles:

- 1) Allen CJ, Straker RJ, Murray CR, Hannay WH, Hanna MM, Meizoso JP, Manning RJ, Schulman CI, Seery JM, Proctor KG: Recent advances in forward surgical team training at the United States Army Trauma Training Department. Submitted 2/12/2015 to Military Med
- 2) Allen CJ, Meizoso JP, Teisch LF, Ray JJ, Mora J, Ruiz XD, Hanna MM, Shariatmadar S; Schulman CI, Namias N, Dudaryk R, Proctor KG: Concurrent blood component administration with use of liquid plasma during "super" massive transfusion protocol. Revision 1 Submitted 1/20/15 to Surgery
- 3) Allen CJ, Hannay WM, Murray CR, Straker RJ, Meizoso JP, Ray JJ, Hanna MM, Teisch LF, Ruiz-Baez XD, Guarch GA, Schulman CI, Livingstone AS, Namias N, Proctor KG: Causes of death differ between elderly and non-elderly falls. Revision 1 submitted 1/11/15 to Surgery
- 4) Ray JJ, Satahoo SS, Meizoso JP, Allen CJ, Teisch LF, Proctor KG, Pizano LR, Namias N, Schulman CI: Does obesity affect outcomes in adult burn patients? Submitted 12/8/14 to J Surg Res
- 5) Allen CJ, Meizoso JP, Ray JJ, Teisch LF, Hanna MH, Ruiz-Baez X, Guarch GA, Livingstone AS, Schulman CI, Namias N, Proctor KG: Is hydroxyethyl starch safe in penetrating trauma patients? An analysis with propensity score matching. Submitted to Military Med
- 6) Allen CJ, Murray CR, Meizoso JP, Ray JJ, Teisch LF, Ruiz XD, Hanna MM, Guarch GA, Manning RJ, Livingstone AS, Schulman CI, Namias N, Proctor KG: Coagulation profile changes due to thromboprophylaxis and platelets in trauma patients at high risk for venous thromboembolism. Amer Surgeon in press
- 7) Allen CJ, Hsu A, Murray CR, Meizoso JP, Ray JJ, Schulman CI, Livingstone AS, Lineen EB, Ginzburg E, Namias N, Proctor KG: Risk of pulmonary embolism with repair or ligation of major venous injury following penetrating trauma J Trauma Acute Care Surg in press
- 8) Allen CJ, Valle EJ, Jouria JM, Schulman CI, Namias N, Livingstone AS, Proctor KG: Differences between blunt and penetrating trauma after resuscitation with hydroxyethyl starch J Trauma Acute Care Surg 2014 Dec;77(6):859-864.
- 9) Allen CJ, Tashiro J, Valle EJ, Thorson CM, Shariatmadar S, Schulman CI, Neville HL, Proctor KG, Sola JE: Initial hematocrit predicts the use of blood transfusion in the pediatric trauma patient. J Ped Surg 2014 Nov; 49(11):1678-1682
- 10) Valle EJ, Van Haren RM, Allen CJ, Jouria JM, Bullock MR, Schulman CI, Namias N, Livingstone AS, Proctor KG: Does traumatic brain injury increase the risk for venous thromboembolism in polytrauma patients? J Trauma Acute Care Surg 2014 Aug;77(2):243-50.
- 11) Ryan ML, Van Haren RM, Thorson CM, Andrews DM, Perez EA, Neville HL, Sola JE, Proctor KG: Trauma-induced hypercoagulability in pediatric patients. J Ped Surg 2014 Aug; 49(8):1295-1299
- 12) Valle EJ, Allen CJ, Van Haren RM, Jouria JM, Li H, Livingstone AS, Namias N, Schulman CI, Proctor KG:

- Do all trauma patients benefit from tranexamic acid? J Trauma Acute Care Surg 2014 Jun;76(6):1373-8.
- 13) Van Haren RM, Thorson CM, Valle EJ, Guarch GA, Jouria JA, Busko AM, Namias N, Livingstone AS, Proctor KG: Vasopressor use during emergency trauma surgery Amer Surgeon 2014 May; 80(5): 472-8
 - 14) Van Haren RM, Valle EJ, Thorson CM, Jouria JA, Busko AM, Guarch GA, Namias N, Livingstone AS, Proctor KG: Hypercoagulability and other risk factors in trauma ICU patients with venous thromboembolism J Trauma Acute Care Surgery 2014 Feb;76(2):443-9.
 - 15) Van Haren RM, Ryan ML, Thorson CM, Namias N, Livingstone AS, Proctor KG: Bilateral near infrared spectroscopy for detecting traumatic vascular injury. J Surg Res. 2013 Sep;184(1):526-32
 - 16) Van Haren RM, Thorson CM, Valle EJ, Busko AM, Guarch GA, Andrews DM, Pizano LR, Schulman CI, Namias N, Proctor KG: Hypercoagulability after burn injury. J Trauma Acute Care Surg 2013 Jul;75(1):37-43.
 - 17) Thorson CM, Van Haren RM, Otero CA, Guarch GA, Curia E, Barrera JM, Busko AM, Namias N, Bullock MR, Livingstone AS, Proctor KG: Repeat head computed tomography after minimal brain injury identifies the need for craniotomy in the absence of neurologic change. J Trauma Acute Care Surg 2013 Apr;74(4):967-75.
 - 18) Thorson CM, Ryan ML, Pereira R, Olloqui J, Otero CA, Schulman CI, Livingstone AS, Proctor KG: Change in hematocrit during trauma assessment predicts bleeding even with ongoing fluid resuscitation Amer Surgeon 2013 Apr;79(4):398-406.
 - 19) Thorson CM, Van Haren RM, Ryan ML, Pereira R, Olloqui J, Guarch GA, Barrera JM, Busko AM, Livingstone AS, Proctor KG: Admission hematocrit and transfusion requirements after trauma. J Am Coll Surg 2013 Jan;216(1):65-73. Epub 2012 Nov 21.
 - 20) Van Haren RM, Thorson CM, Curia E, Schulman CI, Namias N, Livingstone AS, Proctor KG: Impact of definitions on trauma mortality rates and performance. J Trauma Acute Care Surg 2012 Dec;73(6):1510-4.
 - 21) Thorson CM, Ryan ML, Van Haren RM, Curia E, Barrera JM, Guarch GA, Busko AM, Namias N, Livingstone AS, Proctor KG: Venous thromboembolism after trauma: A Never event? Crit Care Med 2012 Nov;40(11):2967-73.
 - 22) Ryan ML, Ogilvie MP, Pereira BMT, Gomez-Rodriguez JC, Livingstone AS, Proctor KG: Effect of hetastarch bolus in trauma patients requiring emergency surgery. J Special Op Med 2012 Fall 12(3):57-67.
 - 23) Ryan ML, Thorson CM, King DR, Van Haren RM, Manning RJ, Andrews DM, Livingstone AS, Proctor KG: Insertion of central venous catheters induces a hypercoagulable state. J Trauma Acute Care Surg. 2012 Aug;73(2):385-90.
 - 24) Thorson CM, Namias N, Van Haren RM, Guarch GA, Ginzburg E, Salerno TA, Schulman CI, Livingstone AS, Proctor KG: Does hemopericardium after chest trauma mandate sternotomy? J Trauma Acute Care Surg. 2012 Jun;72(6):1518-25
 - 25) Thorson CM, Ryan ML, Otero CA, Vu T, Schulman CI, Borja MJ, Jose J, Livingstone AS, Proctor KG: Operating room or angiography suite for hemodynamically unstable pelvic fractures? J Trauma Acute Care Surg. 2012 Feb;72(2):364-70; discussion 371-2.
 - 26) Ryan ML, Thorson CM, Otero CA, Vu T, Schulman CI, Livingstone AS, Proctor KG. Initial Hematocrit in Trauma: A Paradigm Shift? J Trauma Acute Care Surg. 2012 Jan;72(1):54-9; discussion 59-60.
 - 27) Ogilvie MP, Pereira BMT, Ryan ML, Gomez-Rodriguez JC, Pierre EJ, Livingstone AS, Proctor KG: Bispectral Index (BIS) to monitor propofol sedation in trauma patients: J Trauma. 2011 Nov 71(5):1415-21.

Other works, presentations and abstracts

- 1) Ray JJ, Satahoo SS, Spalding PB, Julien K, Meizoso JP, Allen CJ, Bramlett HM, Proctor KG, Pizano LR, Namias N, Schulman CI: Does Therapeutic Hypothermia Attenuate the Hyper-Inflammatory Response After Burns? Accepted for presentation 47th Annual Meeting of American Burn Assoc, Chicago, IL Apr 2015
- 2) Allen CJ, Meizoso JP, Hannay WM, Ray JJ, Schulman CI, Livingstone AS, Sola JE, Namias N, Proctor KG: Predictors of survival in pediatric trauma: A comparison of the international classification injury severity score (ICISS) to existing injury scoring tools. Accepted for presentation to 15th annual John M. Templeton Jr Pediatric Trauma Symposium, Pittsburgh, PA Mar 2015
- 3) Allen CJ, Meizoso J, Nissan J, Tiesch L, Sola J, Neville H, Schulman C, Namias N, Proctor K: Deep venous thrombosis in pediatric trauma. Accepted for presentation 46th annual American Pediatric Surgical Association Fort Lauderdale, FL May 2014
- 4) Teisch LF, Nissan JJ, Satahoo SS, Allen CJ, Meizoso JP, Guarch GA, Proctor KG, Pizano LR, Namias N, Schulman CI: Fluid resuscitation and independent contributors to death during hospitalization in burn patients. Presented at 12th Annual AMA Research Symposium Dallas, TX Nov 2014
- 5) Meizoso JP, Allen CJ, Nissan JJ, Thorson CM, Pizano LR, Namias N, Proctor KG, Sola JE, Schulman CI: Predictors of mortality following pediatric burns: a 20 yr review of an ABA burn center. accepted for presentation 10th Annual Academic Surgical Congress, Las Vegas, NV Feb 2015
- 6) Nissan JJ, Satahoo SS, Allen CJ, Meizoso JP, Thorson CM, Teisch LF, Sola JE, Proctor KG, Pizano LR, Namias N, Schulman CI: Does obesity affect outcomes in adult burn patients?
 - a. accepted for presentation 10th Annual Academic Surgical Congress, Las Vegas, NV Feb 2015
 - b. presented at 27th Annual Southern Region Burn Conference Southern Medical Assoc Houston, TX Nov 2014
- 7) Allen CJ, Hannay WM, Murray CR, Straker RJ, Meizoso JP, Ray JJ, Hana M, Teisch LF, Ruiz-Baez XD, Guarch GD, Schulman CI, Livingstone AS, Namias N, Proctor KG: Falls in the elderly: A cause of death at a level 1 trauma center. accepted for presentation 10th Annual Academic Surgical Congress, Las Vegas, NV Feb 2015
- 8) Allen CJ, Meizoso JP, Nissan JJ, Teisch LF, Zebib L, Moore GM, Namias N, Schulman CI, Dudaryk R, Proctor KG: Administration of Target Blood Component Ratio During Super Massive Transfusion Protocol. accepted for presentation 10th Annual Academic Surgical Congress, Las Vegas, NV Feb 2015
- 9) Allen CJ, Straker RJ, Tashiro J, Meizoso JP, Nissan JJ, Hanna M, Schulman CI, Namias N, Proctor KG, Rey J, Sola JE: Pediatric Vascular Injury: Experience of a High Volume Level 1 Trauma Center. Accepted for presentation 10th Annual Academic Surgical Congress, Las Vegas, NV Feb 2015
- 10) Allen CJ, Meizoso JP, Nissan JJ, Ruiz XD, Hanna MM, Schulman CI, Namias N, Proctor KG: Coagulation Profile Changes Due To Thromboprophylaxis And Platelets In Trauma Patients At High-Risk For Venous Thromboembolism. Accepted for presentation 2015 Annual Scientific Meeting Southeastern Surgical Congress, Chattanooga, TN, Feb 2015
- 11) Valle EJ, Allen CJ, Van Haren RM, Jouria JM, Li H, Livingstone AS, Proctor KG: Tranexamic acid may have undesirable actions in some trauma patients. Presented at 2014 MHSRS (Military Health Science Research Symposium), Fort Lauderdale, FL, Aug 2014
- 12) Allen CJ, Valle EJ, Bullock MR, Schulman CI, Namias N, Livingstone AS, Proctor KG: Diagnosis and treatment of traumatic brain injury. Presented at 2014 MHSRS (Military Health Science Research Symposium), Fort Lauderdale, FL, Aug 2014
- 13) Allen CJ, Valle EJ, Schulman CI, Namias N, Livingstone AS, Proctor KG: Is the use of hydroxyethyl starch solutions safe in trauma patients? Presented at 2014 MHSRS (Military Health Science Research Symposium), Fort Lauderdale, FL, Aug 2014
- 14) Allen CJ, Hsu A, Valle EJ, Namias N, Livingstone AS, Lineen E, Proctor KG. Repair vs ligation of major venous injury after penetrating trauma: is there a difference in the development of pulmonary

embolism? Presented at 73rd Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery Philadelphia, PA Sep, 2014

- 15) Allen CJ, Valle EJ, Jouria JM, Schulman CI, Namias N, Proctor KG: Does isolated hemoperitoneum cause peritonitis? A review of 400 trauma laparotomies Presented at South Florida Chapter of the American College of Surgeon's 25th Annual Fellow, Resident & Medical Student Surgical Research Forum Paper Presentations Miami Beach, FL May 2014 (*3rd place Research Award)
- 16) Allen CJ, Valle EJ, Schulman CI, Zakrison T, Namias N, Livingstone AS, Proctor KG: The hypercoagulability of blunt trauma. Presented at 61st annual meeting Florida Chapter, American College of Surgeons, Weston, FL May 2014
- 17) Allen CJ, Tashiro J, Valle EJ, Thorson C, Schulman C, Neville H, Proctor KG, Sola JE. Initial hematocrit guides the use of blood transfusion in the pediatric trauma patient.
 - a. Presented at 14th Annual John M. Templeton Jr. Pediatric Trauma Symposium, Philadelphia, PA Mar 2014
 - b. Presented at 6th Annual Postdoctoral Fellows Research Day, University of Miami Miller School of Medicine, Miami, FL Sep 2014
 - c. Accepted for presentation at 6th Annual Southwest Trauma and Acute Care Symposium, Scottsdale, AZ Nov 2014
- 18) Allen CJ, Tashiro J, Valle EJ, Thorson C, Schulman C, Neville H, Proctor KG, Sola JE. Survival factors following pediatric trauma: a 13 year review of a high volume level 1 trauma center. Presented at 14th Annual John M. Templeton Jr. Pediatric Trauma Symposium, Philadelphia, PA, Mar 2014
- 19) Allen CJ, Valle EJ, Jouria JM, Namias N, Livingstone AS, Schulman CI, Proctor KG: Differences in acute kidney injury and death between blunt and penetrating trauma after resuscitation with hydroxyethyl starch
 - a) Presented at 44th Annual Meeting, Western Trauma Association, Steamboat Springs, CO Mar 2014
 - b) Presented at South Florida Chapter of the American College of Surgeon's 25th Annual Fellow, Resident & Medical Student Surgical Research Forum Paper Presentations Miami Beach, FL May 2014 (* 1st place Research Award).
- 20) Gushka J, Parikh P, Proctor K, Namias N, Zakrison T: The equivocal FAST in penetrating thoracic trauma, beware the occult cardiac injury with left-sided hemothorax: presented at 26th PanAmerican Trauma Congress Santiago, Chile Nov 2013; <http://www.panamtrauma.org/> (*2nd place Research Award)
- 21) Allen CJ, Valle EJ, Jouria JM, Namias N, Livingstone AS, Schulman CI, Proctor KG: Is initial trauma resuscitation low volume starch solution associated with renal injury or mortality? Presented at 2013 Annual Meeting, American College of Surgeons, Florida Committee on Trauma Resident Paper Competition, Tampa, FL Nov 2013.
- 22) Valle EJ, Van Haren RM, Guarch GA, Jouria JM, Bullock MR, Namias N, Schulman CI, Livingstone AS, Proctor KG: Risk factors and venous thromboembolism in patients with polytrauma± traumatic brain injury. Presented 9th Annual Academic Surgical Congress San Diego, CA Feb 2014 (* Resident Research Award and Best Trauma/Critical Care Abstract)
- 23) Valle EJ, Van Haren RM, Bullock MR, Guarch GA, Jouria JM, Livingstone AS, Blackbourne LH, Namias N, Proctor KG. Effects of mannitol on fluid and blood product requirement during CPP management in polytrauma patients. Presented at 60th Annual meeting of the Florida Chapter of American College of Surgeons. Orlando, FL May 2013.
- 24) Valle EJ, Van Haren RM, Guarch GA, Duncan RC, Schulman CI, Jouria JA, Blackbourne LH, Namias N, Livingstone AS, Proctor KG: Do all patients benefit from tranexamic acid? The experience of an urban level 1 trauma center. Presented at 72nd Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery, San Francisco, CA Sep, 2013
- 25) Van Haren RM, Valle EJ, Busko AM, Guarch GA, Jouria JA, Namias N, Livingstone AS, Proctor KG: Safety

and Efficacy of Tranexamic Acid in Trauma Patients at High Risk for Venous Thromboembolism.

- a) J Am Coll Surg, 2013 Sept; 217(3), Supplement; S49 Presented at American College of Surgeons' 99th Clinical Congress Washington, DC Oct 2013
 - b) Presented at the 6th Annual Copeland Resident Paper Competition at the 60th Annual meeting of the Florida Chapter of American College of Surgeons. Orlando, FL May 2013 (*1st place Research Award).
- 26) Zakrison T, Parikh P, Murtha M, Schulman C, Namias N, Proctor KG: The Risk of cardiac injury after penetrating thoracic trauma: Which is the better predictor--hemodynamic status or pericardial window? Presented at Trauma Association of Canada, Whistler, BC Apr 2013
- 27) Van Haren RM, Thorson CM, Ryan ML, Curia E, Barrera JM, Guarch GA, Busko AM, Namias N, Livingstone AS, Proctor KG: Vasopressor use during emergency surgery in patients with refractory shock. Presented at 2013 Southeastern Surgical Congress Jacksonville, FL Feb 2013.
- 28) Van Haren RM, Thorson CM, Valle EJ, Guarch GA, Busko AM, Namias N, Livingstone AS, Proctor KG: Thromboelastography and venous thromboembolism in trauma patients.
- a) Presented at 2012 Annual Meeting, American College of Surgeons, Florida Committee on Trauma Resident Paper Competition, Gainesville, FL Oct 2012 (*1st place Research Award)
 - b) Presented at 2012 Region IV American College of Surgeons Committee on Trauma Resident Paper Competition, Memphis TN, Nov 2012 (*2nd place Research Award)
 - c) Presented at 42nd Critical Care Congress, Society of Critical Care Medicine, San Juan, Puerto Rico, Jan, 2013.
- 29) Van Haren RM, Ryan ML, Thorson CM, Curia E, Busko AM, Namias N, Livingstone AS, Proctor KG: Bilateral near infrared spectroscopy: a potential tool for detecting vascular injuries.
- a) Presented at South Florida Society for Vascular Surgery 2012 Annual Scientific Sessions, Islamorada, Florida Keys. Oct 2012
 - b) Presented at Academic Surgical Congress New Orleans, LA Feb 2013
- 30) Van Haren RM, Thorson CM, Curia E, Busko AM, Guarch GA, Barrera JM, Andrews DM, Pizano LR, Schulman CI, Namias N, Proctor KG: Hypercoagulability after thermal injury. Presented at 26th EAST Annual Scientific Assembly Raymond H. Alexander Competition, Scottsdale, AZ Jan 2013 (*Resident Travel Scholarship *2nd place Research Award)
- 31) Van Haren RM, Thorson CM, Ryan ML, Ogilvie MP, Bullock MR, Jagid JR, Livingstone AS, Proctor KG: Vasopressor use in trauma patients with refractory hypotension: from benchtop to bedside: Presented at Military Health System Research Symposium MHSRS/ATACCC 2012, Fort Lauderdale, FL, Aug 2012.
- 32) Thorson CM, Van Haren RM, Ryan ML, Pizano LR, Schulman CI, Andrews DM, Namias N, Livingstone AS, Proctor KG: Trauma-induced hypercoagulability: Presented at Military Health System Research Symposium MHSRS/ATACCC 2012, Fort Lauderdale, FL, Aug 2012
- 33) Thorson CM, Van Haren RM, Ryan ML, Guarch GA, Curia E, Busko AM, Namias N, Livingstone AS, Proctor KG: Hematocrit during initial trauma triage: Presented at Military Health System Research Symposium MHSRS/ATACCC 2012, Fort Lauderdale, FL, Aug 2012
- 34) Thorson CM, Van Haren RM, Namias N, Otero C, Curia E, Busko A, Barrera J, Guarch GA, Bullock MR, Livingstone AS, Proctor KG: Repeat head CT after minimal brain injury predicts need for craniotomy in absence of neurologic change.
- a) Presented at 71st Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery Kauai, Hawaii Sep 2012 (*Resident Travel Scholarship) <http://www.aast.org>
 - b) Presented at 2011 American College of Surgeons Florida Committee on Trauma Resident Paper Competition, Miami, FL, Nov 2011 (*1st place Research Award)
 - c) Presented at American College of Surgeons Region IV Committee on Trauma Resident

Paper Competition, Kiawah Island SC, Nov 2011

- 35) Van Haren RM, Thorson CM, Curia E, Busko AM, Andrews DM, Pizano LR, Schulman CI, Namias N, Proctor KG: Burn-induced hypercoagulability.
- a) Presented at 5th Annual Copeland Resident Paper Competition Florida Chapter of American College of Surgeons, Sarasota, FL May 2012 (*2nd place research Award)
 - b) Presented at 23rd Annual Fellow, Resident, and Medical Student Surgical Research Forum, South Florida Chapter of the American College of Surgeons, Miami, FL Apr 2012 (*2nd place Research Award)
- 36) Thorson CM, Ryan ML, Van Haren RM, Curia E, Barrera JM, Guarch G, Busko AM, Namias N, Livingstone AS, Proctor KG. Risk assessment profile to screen for venous thromboembolism in trauma patients.
- a) Presented at 23rd Annual Fellow, Resident, and Medical Student Surgical Research Forum, South Florida Chapter of the American College of Surgeons, Miami, FL Apr 2012 (*3rd place Research Award)
 - b) Presented at 41st Critical Care Congress, Society of Critical Care Medicine, Houston, TX, Feb 2012 Crit Care Med 2011 Dec 39:12 (Suppl) A106 (*Burns/Trauma Specialty Award)
- 37) Van Haren RM, Thorson CM, Curia E, Schulman CI, Namias N, Livingstone AS, Proctor KG. Mortality is not a reliable quality metric in trauma. Presented at 42nd Annual Meeting of Western Trauma Assoc, Vail, CO Mar 2012 www.westerntrauma.org/documents/meeting/2012/WTAProgramBook2012.pdf
- 38) Ryan ML, Thorson CM, King DR, Otero CA, Vu T, Manning RJ, Livingstone AS, Proctor KG. Insertion of Central Venous Catheters Induces a Hypercoagulable State. Presented at 25th Annual Meeting of the Eastern Assoc. for the Surgery of Trauma, Lake Buena Vista, FL Jan 2012; http://www.east.org/content/documents/2012_oral_abstracts.pdf
- 39) Thorson CM, Van Haren RM, Ryan ML, Pereira R, Olloqui J, Guarch GA, Curia E, Barrera J, Busko AM, Livingstone AS, Proctor KG. Admission Hematocrit Predicts Transfusion Requirements in Trauma Patients
- a) Presented at 2011 American College of Surgeons Florida Committee on Trauma Resident Paper Competition, Miami, FL, Nov 2011
 - b) Presented at 5th Annual Copeland Resident Paper Competition Florida Chapter American College of Surgeons, Sarasota, FL May 2012 (*1st place research Award)

F. SUMMARY

The MWVSM monitor cannot reliably triage trauma patients and therefore should not be deployed.